A Note on Feeding and Excretion in Bivalves

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Recent studies on the faecal pellets of bivalve molluscs (Kornicker, 1962; Arakawa, 1963, 1965) and on their rectum (Jegla & Greenberg, 1968) have drawn attention to yet another aspect of variation in the morphology and functioning of the gut of bivalves. There is, however, a facet of functional variation which I believe might be relevant to these studies and which came to my notice while I was conducting some feeding experiments on bivalves (*Mytilus, Cardium*), using different unialgal cultures. Some of the main points of these observations are:

a) the form and type of faecal ribbon ejected from the animal was found to depend upon the time ingested material was retained within the gut;

b) this was found to vary with the type of 'food' material used (or available to the animal), as well as the rate of its passage through the gut;

c) with higher concentration of food material in the medium, strong rejectory mechanisms in the stomach caused ingested matter to be rejected and expelled rapidly as faeces, at times within 20 minutes of intake;

d) faecal ribbons were initially composed wholly of unutilized 'food' (in my experiments, live algal cells) loosely bound with quantities of mucus;

e) subsequent faecal ribbons were usually of a different texture, colour and form; and those expelled after an interval of 12 to 20 hours after intake were markedly different in these aspects from the first-formed ribbons; the quantity of mucus in the faeces usually proved to be an indicator of retention-time within the gut: [in *Mytilus* for example, faecal ribbons varied in cross-section from shapeless to oval to cylindrical mass, with a thick or thin or a separated keel-like part; and in colour from greenish to brownish shades;

f) coarser material tended to be localized in faecal ribbons and these probably marked the sites of grooves in the gut.

Therefore, in classifying faecal ribbons on the basis of their physical characteristics, one has to take into account this variability which may be directly related to the amount and type of food available to the animal. Kornicker (1962) has in fact recorded for filibranchs and eulamellibranchs a wide range of faecal types from 'unsculptured' to 'oval' to 'shapeless' masses. Allen (1961) and van Weel (1961) have reported how faecal material may vary in colour varying with the time within the gut. Observations by Loosanoff & Engle (1947) and Haven & Alamo (1966) may also be cited in this connection since these authors have drawn attention to negative correlation between faeces and total seston and to greater faecal production at lowest levels of seston in oysters. These reveal sources of variability in faecal production according to the amount and type of food available to continuous feeders such as the bivalves.

Another consideration is that though the term 'faeces' generally means all matter rejected from the gut, usually the larger sense that it specifies refuse matter **after digestion** is brought in by connotation. This is, for example, implied in the observations by Jegla & Greenberg (1968), who regard the "**preparation** and propulsion of fecal matter as an important and mandatory function of the rectum" in the bivalves also. The time of retention within the hindgut of ingested matter, as well as the rate of its passage through other regions of the gut are factors to be established for a more functional interpretation of these structures in the bivalves. There appears in fact to be a greater need for observations at different times in natural populations in the field in order to resolve many questions of bivalve nutrition.

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